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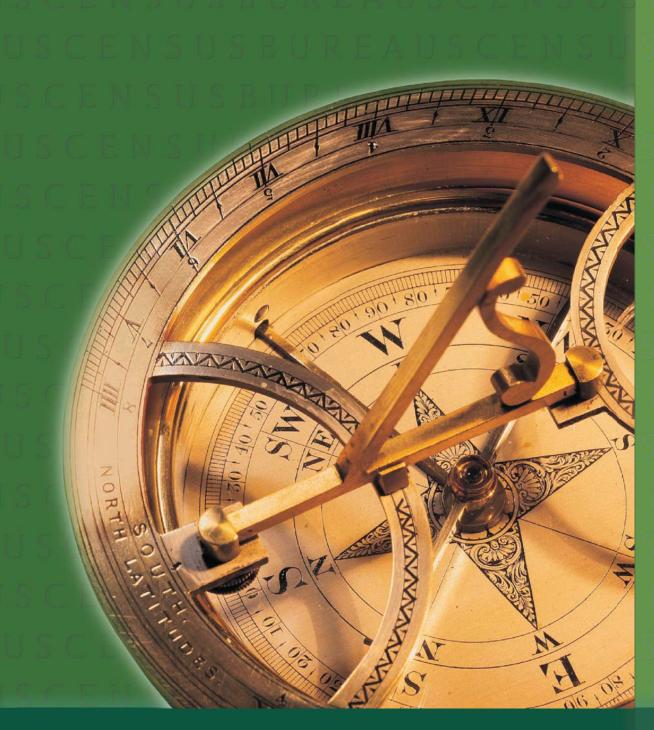
A Compass for Understanding and Using American Community Survey Data

What General Data Users Need to Know

Issued
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U.S. Department of Commerce
Carlos M. Gutierrez,
Secretary

John J. Sullivan,
Deputy Secretary

Economics and Statistics Administration
Cynthia A. Glassman,
Under Secretary for Economic Affairs

U.S. CENSUS BUREAU
Steve H. Murdock,
Director

ECONOMICS
AND STATISTICS
ADMINISTRATION

**Economics and Statistics
Administration**

Cynthia A. Glassman,
Under Secretary for Economic Affairs

U.S. CENSUS BUREAU

Steve H. Murdock,
Director

Thomas L. Mesenbourg,
Deputy Director and
Chief Operating Officer

Arnold A. Jackson
Associate Director for Decennial Census

Daniel H. Weinberg
Assistant Director for ACS and Decennial Census

Susan Schechter
Chief, American Community Survey Office

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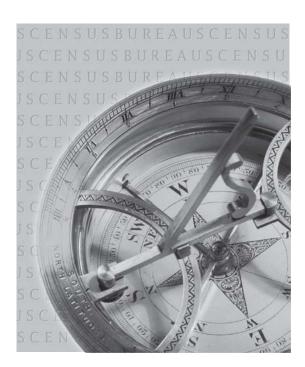
The ACS samples nearly 3 million addresses each year, resulting in nearly 2 million final interviews. The annual ACS sample is smaller than that of the Census 2000 long-form sample, which included about 18 million housing units. As a result, the ACS needs to combine population or housing data from multiple years to produce reliable numbers for small counties, neighborhoods, and other local areas. To provide information for communities each year, the ACS will provide 1-, 3-, and 5-year estimates.

ACS data are very timely because they are released in the year immediately following the year in which they are collected. ACS data collected from 2000 through 2004, and published from 2001 through 2005, are available for areas with 250,000 people or more,

including all states, the District of Columbia, and many large counties and cities. As shown in Table 2, starting with the data collected in 2005, ACS information has been published for areas with populations of 65,000 or more. In the fall of 2008, the first 3-year estimates will be released based on data from the 2005, 2006, and 2007 surveys. By December 2009, the ACS will have sampled approximately 15 million addresses, and by 2010, the ACS will provide the first 5-year estimates of demographic, housing, social, and economic characteristics for the nation, states, cities, counties, and other small geographic areas. These 5-year estimates will then be updated annually by removing the earliest year and replacing it with the latest one, and will provide, for the first time, the ability to monitor social and economic trends in local communities.

Table 2. **Release Schedule for ACS Data**									
		Year of Data Release							
Data product	**Population threshold**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
		Year(s) of Data Collection							
1-year estimates	65,000+	2005	2006	2007	2008	2009	2010	2011	2012
3-year estimates	20,000+			2005– 2007	2006– 2008	2007– 2009	2008– 2010	2009– 2011	2010– 2012
5-year estimates	All areas*					2005– 2009	2006– 2010	2007– 2011	2008– 2012

*Five-year estimates will be available for areas as small as census tracts and block groups.
Source: U.S. Census Bureau.

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Differences Between the ACS and the Decennial Census

While the main function of the decennial census is to provide *counts* of people for the purpose of congressional apportionment and legislative redistricting, the primary purpose of the ACS is to measure the changing social and economic *characteristics* of the U.S. population. As a result, the ACS does not provide official counts of the population in between censuses. Instead, the Census Bureau's Population Estimates Program will continue to be the official source for annual population totals, by age, race, Hispanic origin, and sex. For more information about population estimates, visit the Census Bureau's Web site at <www.census.gov/popest/estimates.php>, or see Appendix 7 of this handbook. ACS estimates are controlled to match the Census Bureau's annual population estimates, by age, sex, race, and Hispanic origin.

Although the questions used in the ACS are very similar to those included on the long form used in Census 2000, there are some important differences between the two surveys. While the decennial census has provided a snapshot of the U.S. population once every 10 years, the ACS has been described as a "moving video image, continually updated to provide much needed data about our nation in today's fast-moving world."[3]

Because ACS data are collected continuously, they are not always comparable with data collected from the decennial census. For example, in the case of employment statistics, both surveys ask about employment status during the week prior to the survey. However, data from the decennial census are typically collected between March and August, whereas data from the ACS are collected nearly every day and reflect employment throughout the year. Differences in these responses may in turn affect data on commuting, occupation, and industry.[4] Other factors that may also have an impact on the data, such as seasonal variation in population and minor differences in question wording and question order, are described in more detail in Appendix 2 of this handbook. Additional guidance on making comparisons between ACS and census data is also provided in the section on "Making Comparisons" in Appendix 4.

Readers should also note that in 2006, the ACS began including samples of the population living in group quarters (e.g., jails, college dormitories, and nursing homes) for the first time. As a result, 2006 ACS data may not be comparable with data from earlier ACS surveys. This is especially true for estimates of young adults and the elderly, who are more likely than other groups to be living in group quarters facilities.

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[3] Kathleen B. Cooper, "Halfway to the 2010 Census: The Countdown and Components to a Successful Decennial Census," paper presented to the House Subcommittee on federalism and the census, U.S. House of Representatives, Washington, DC, April 19, 2005, <www.ogc.doc.gov/ogc/legreg/testimon/109f/Cooper0419.htm>.

[4] U.S. Census Bureau, "Meeting 21st Century Demographic Data Needs—Implementing the American Community Survey, Report 5: Comparing Economic Characteristics With Census 2000," Washington DC, 2004, <http://www.census.gov/acs/www/Downloads/Report05.pdf>.

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Benefits and Challenges of ACS Data

The ACS provides several advantages over the information that has been collected in the past through the decennial census long-form samples. The main benefits of the ACS are timeliness and access to annual data for states, local areas, and small population subgroups. The ACS will deliver useful, relevant data, similar to data from previous census long forms, but updated every year instead of every 10 years.

Federal, state, and local governments and planners rely on demographic, housing, social, and economic data in their budget formulations and to allocate funds. For example, ACS data can be used to determine funding levels for food stamp programs or to help decide where to build a new school, highway, or day care center. Corporations, small businesses, and individuals can use these data to develop business plans, to set strategies for expansion or starting a business, and to determine trends in their service areas to meet current and future needs.

Small towns and rural communities have much to gain from the ACS. Lacking the staff and resources to conduct their own research, many local communities rely on decennial census information that becomes increasingly outdated throughout the decade, or use local administrative records that are not comparable with information collected in neighboring areas.[7]

The ACS also provides tools for those who want to conduct their own research. The ACS includes a Public Use Microdata Sample (PUMS) file each year that enables researchers to create custom universes and tabulations from individual ACS records that have been stripped of personally identifiable information. The 2006 ACS PUMS file includes about 1.2 million housing units, about two-thirds of the 2 million housing units that were interviewed and included in the published ACS tabulations for 2006.[8]

The use of professional, highly trained, permanent interviewers has improved the accuracy of ACS data compared with those from the decennial census long-form sample. This strategy has effectively reduced the number of refusals to complete the ACS questionnaire. ACS interviewers also obtain more complete information than decennial census interviewers. For example, a comparison between ACS and Census 2000 data for the Bronx showed that while the Census 2000 had a higher initial mail response rate than the ACS, it was

less effective than the ACS during follow-up phases, when information is collected from nonrespondents.[9] As a result, ACS item allocation rates are lower, and nonsampling error is reduced.

The main challenges for ACS data users are understanding and using multiyear estimates and the relatively large confidence intervals associated with ACS data for smaller geographic areas and subgroups of the population. Both of these issues are addressed in more detail below. ACS data will be produced every year, but in exchange for this benefit, the sample size of the ACS needs to be smaller than that of the Census 2000 long-form sample.

By 2010, data users will have access to 5-year estimates of ACS data. The sample size based on 5-year period estimates of ACS data is still smaller than the long-form sample in the decennial census, resulting in larger standard errors in the ACS 5-year estimates. Census Bureau researchers expect that the higher sampling error in the ACS is offset, to some extent, by a reduction in nonsampling error, due to the use of experienced ACS interviewers and the refusal to allow survey data to be obtained from neighbors.[10]

Finally, the ACS includes several questions that are very similar to those collected in other federal surveys—especially the Current Population Survey (CPS), the American Housing Survey, and the Survey of Income and Program Participation. In some cases, there are clear guidelines about which data to use. For example, the CPS is the official source of income and poverty data. It includes detailed questions on these topics and should be used in reporting national trends in these subject areas. The Census Bureau recommends that ACS information on income and poverty be used to supplement CPS data for areas below the state level and for population subgroups (such as age, sex, race, Hispanic origin, type of household) at the state level. See the fact sheet available at <http://www.census.gov/Press-Release /www/2007/acs_vs_cps.htm>. For states, generally the Census Bureau recommends using the ACS, though the CPS is still valuable as a source for examining historical state income and poverty trends.[11]

Refer to Appendix 8, particularly the section "ACS Design, Methodology, Operations" for more information. Further information on the methodology of the ACS is available on the Census Bureau Web site.

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[7] David Swanson and George Hough, "An Evaluation of the American Community Survey: Preliminary Results From a County Level Analysis of the Oregon Test Site," paper presented at the Annual Meeting of the Mississippi Academy of Sciences, Biloxi, Mississippi, February 19–20, 2004, <http://www.olemiss.edu/depts/population_studies /WorkingPapers/MAS_ACS_FINAL_REV1a.pdf>.

[8] The ACS includes nearly 3 million addresses in its initial sample each year. However, a subsample of the addresses that do not respond via mail or telephone is selected to be visited in person, resulting in approximately 2 million final interviews each year.

[9] Joseph J. Salvo, "Making it in the Bronx: First the Yankees, Next the ACS? Analysis of Nonresponse in the Bronx Test Site," and Susan P. Love "Making it in the Bronx: A Supplement," papers presented at the American Community Survey Research Group Session, March 11, 2003, <http:// www.census.gov/acs/www/AdvMeth/Papers/Papers43_intro.htm>.

[10] Charles H. Alexander, "American Community Survey Data for Economic Analysis," paper presented to the Census Advisory Committee of the American Economic Association, Washington, DC, October 18–19, 2001, <http://www.census.gov/acs/www/Downloads/ACS/Paper32.doc>.

[11] U.S. Census Bureau, "U.S. Census Bureau Guidance on Using 2007 Income and Poverty Estimates From the Current Population Survey and American Community Survey," <http://www.census.gov/Press-Release /www/2007/guidance_acs_cps.htm>.

estimates for Nantucket, a small island off the coast of Massachusetts, with estimates for Boston. Even though the ACS publishes 1-year estimates for Boston, only 5-year estimates will be published for Nantucket. Thus, in 2010, when 5-year estimates for smaller geographic areas become available, compare 2005–2009 estimates for Nantucket with 2005–2009 estimates for Boston, even though more recent, single-year estimates are available for Boston.

Other alternatives for presenting ACS data for less populated areas include showing single-year estimates for large counties in Massachusetts and then combining the remaining counties into a state "residual" by subtracting the available single-year data from the state total. Or, you could present data for PUMAs, since they meet the 65,000-population threshold required for single-year estimates and are often used as a substitute for county-level data.[12]

While multiyear estimates provide valuable data for small geographic areas, using them to look at trends for small populations can be challenging because they rely on pooled data for 3 or 5 years. For example, comparisons of 3-year estimates from 2005 to 2007

and 2006 to 2008 are unlikely to show much difference because two of the years overlap (both sets of estimates include the same data collected in 2006 and 2007). The overlap is even greater for the 5-year estimates used for areas with fewer than 20,000 people. The Census Bureau suggests comparing periods that do not overlap—comparing 2005–2007 estimates with 2008–2010 estimates, for example. This means waiting longer to identify a trend. However, in areas undergoing fundamental shifts in the size or composition of the population, change may be so substantial that it will be obvious after only a few years. Additional guidance on the use and interpretation of single-year and multiyear estimates is provided in Appendix 1.

Data users also need to use caution in looking at trends involving income or other measures that are adjusted for inflation, such as rental costs, home values, and energy costs. Appendix 5 provides information on the adjustment of single-year and multiyear ACS estimates for inflation. Note that inflation adjustment is based on a national-level consumer price index: it does not adjust for differences in costs of living across different geographic areas.

Understanding Margin of Error

All data that are based on samples, such as the ACS and the census long-form samples, include a range of uncertainty. Two broad types of error can occur: sampling error and nonsampling error. Nonsampling errors can result from mistakes in how the data are reported or coded, problems in the sampling frame or survey questionnaires, or problems related to nonresponse or interviewer bias. The Census Bureau tries to minimize nonsampling errors by using trained interviewers and by carefully reviewing the survey's sampling methods, data processing techniques, and questionnaire design. Appendix 6 includes a more detailed description of different types of errors in the ACS and other measures of ACS quality.

Sampling error occurs when data are based on a sample of a population rather than the full population. Sampling error is easier to measure than nonsampling error and can be used to assess the statistical reliability of survey data. For any given area, the larger the sample and the more months included in the data, the greater the confidence in the estimate. The Census Bureau reported the 90-percent confidence interval on

all ACS estimates produced for 2005 and earlier. With the release of the 2006 ACS data, *margins of error* are now provided for every ACS estimate. Ninety-percent confidence intervals define a range expected to contain the *true* value of an estimate with a level of confidence of 90 percent. Margins of error are easily converted into these confidence ranges. For example, the 2006 ACS *Data Profile* for Massachusetts, shown in Figure 6, shows that 1,175,784 married-couple families resided in the state in 2006. By adding and subtracting the margin of error from the point estimate, we can calculate the 90-percent confidence interval for that estimate:

$$1,175,784 - 11,265 = 1,164,519 = \text{Lower-bound interval}$$
$$1,175,784 + 11,265 = 1,187,049 = \text{Upper-bound interval}$$

Therefore, we can be 90 percent confident that the true number of married-couple families in Massachusetts falls somewhere between 1.16 million and 1.19 million. Detailed information about sampling error and instructions for calculating confidence intervals and margins of error are included in Appendix 3 of this handbook.

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[12] Although Public Use Microdata Areas typically follow county boundaries, this is not always the case, particularly in some New England states.

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For the poverty rate of nonmovers:

$$MOE_p = \frac{\sqrt{\left(\sqrt{(4{,}747^2 + 1{,}902^2)}\right)^2 - (.0423)^2 * \left(\sqrt{(11{,}683^2 + 7{,}264^2)}\right)^2}}{(848{,}119 + 57{,}528)}$$

$$MOE_p = \frac{\sqrt{(5{,}114)^2 - (.0423)^2 * (13{,}757)^2}}{905{,}647}$$

$$MOE_p = \frac{\sqrt{26{,}151{,}613 - .0018 * 189{,}258{,}185}}{905{,}647}$$

$$MOE_p = \frac{5{,}081}{905{,}647} = .0056$$

Therefore, the proportion of nonmovers in poverty ($\hat{p}$) is .0423 with a margin of error (MOE_p) of .0056. Applying the same formulas to the ACS data for newcomers, and multiplying all of the results by 100, she comes up with the following table.

Since the margin of error for newcomers is relatively large, she may want to use the instructions in Appen-dix 4 of this handbook to test whether the difference between these two ACS estimates is statistically significant. But based on her preliminary results, she reports to the other members of the planning commission that the poverty rate for newcomers to Fairfax County—who numbered more than 84,000 just in the past year—may be more than three times higher than the poverty rate for nonmovers.

Table 6. **Poverty Rates for Nonmovers and Newcomers to Fairfax County, Virginia, 2006**		
	Poverty rate	**Margin of error (+/–)**
Nonmovers	4.2	0.6
New county residents	16.7	4.9

Note: Nonmovers include those who did not move plus those who moved from one residence to another within Fairfax County.

Source: U.S. Census Bureau, 2006 American Community Survey.

Avoiding Pitfalls When Working With ACS Data

The ACS data are complex and cover a broad range of topics and geographic areas. Because this is a relatively new survey, many people do not fully understand how to interpret and use the ACS data. In this handbook, we have described some key mistakes to avoid and some precautions to guide you as you delve into the ACS data. These key points are summarized below.

- Use caution in comparing ACS data with data from the decennial census or other sources. Every survey uses different methods, which could affect the comparability of the numbers.

- The ACS was designed to provide estimates of the *characteristics* of the population, not to provide counts of the population in different geographic areas or population subgroups.

- Be careful in drawing conclusions about small differences between two estimates because they may not be statistically different.

- Data users need to be careful not to interpret annual fluctuations in the data as long-term trends.